

VERTE.076A

PATENT

Serial No. 10/059,682

Response to Office Action redated as of September 1, 2005

REMARKS

Claims 1-2, 4-6, 8-20 and 25-26 are in the case. Claim 26 is new. Claims 21-24 are withdrawn

Applicant notes that the Office Action did not take a position on the patentability of claim 25, despite claim 25 being in the case at that time. It is respectfully requested that claim 25 be examined at this time.

*Claim Rejections Under 35 U.S.C. § 103*

In paragraph 3 of the Office Action, claims 1, 2, 4-6, 8, 9, 11, 12, 14 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,754,890 ("Lauerhaas") in view of U.S. Patent No. 4,070,167 to Barbee et al. ("Barbee"), U.S. Patent No. 5,746,981 to Satoh ("Satoh"), and Japanese Reference 8-318234 (the "Japan '234").

More specifically, the Office Action cites Lauerhaus as disclosing "an assembly for cleaning a thin substrate comprising: a transmitter (122) positioned above the substrate where a meniscus of liquid is formed between the substrate and the transmitter; [and] a transducer coupled to the transmitter to create a transmission path from the transducer through the substrate." The Office Action admits, however, that Lauerhaas does not disclose at least one of (1) a gap in the transmission path between the transducer and an end face of the transmitter, and (2) a recess in the end face of the transmitter. The Office Action cites Barbee, Satoh, and the Japan '234 to supply the noted deficiency. The Office Action then asserts that it would have been obvious to one having ordinary skill in the art to modify the transmitter in Lauerhaas as taught by either Satoh, Japan '234, or Barbee for the purpose of "*providing efficient transmission of wave energy to the transmitter.*" As will be explained below, this rejection is improper and the rationale for combining the references both fails to make out a prima facie case of obviousness and is technologically flawed.

**Barbee, Satoh, and Japan '234 Are Non-Analogous Prior Art**

VERTE.076A

PATENT

Serial No. 10/059,682

Response to Office Action redated as of September 1, 2005

To rely on a reference under 35 U.S.C. § 103, the reference must be analogous prior art. *See* MPEP § 2141.01(a). For a reference to be considered analogous prior art, the MPEP is perfectly clear that the reference must either: (1) be in the field of applicant's endeavor; or (2) be reasonably pertinent to the particular problem with which the inventor was concerned." *See* MPEP § 2141.01(a); *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). In the patent application at issue, the present invention relates to the field of cleaning thin flat substrates, namely semiconductor wafers, without causing damage. To the contrary, Barbee is concerned with the reduction of bubble formation in liquids used in the field of photographic emulsion, Satoh is concerned with the mixing of resin material liquids to form a hardened substance, and Japan '234 is concerned with a medical hand washing machine. Despite the common use of a sonic energy oscillator in all of the systems, each technological field has its own objectives, goals, problems, and critical limitations. The fact that the present invention, Barbee, Satoh, and Japan '234 utilize a sonic energy oscillator does not change the fact that the Barbee, Satoh, and Japan '234 references are directed to technological fields that are entirely different than the Applicant's field of endeavor, which is cleaning semiconductors without damage. Therefore, it is absolutely clear that the Barbee, Satoh, and Japan '234 references are not in the same field of Applicant's endeavor.

The second inquiry in determining whether a reference is analogous prior art is whether the reference is reasonably pertinent to the particular problem with which the inventor was concerned." *See* MPEP § 2141.01(a); *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). In performing this inquiry, "the similarities and differences in the structure and function" of the claimed invention and the disclosures of the prior art references are critical. *See* MPEP 2141.01(a); *In re Ellis*, 476 F.2d 1370, 1372, 177 USPQ 526, 527 (CCPA 1973).

As the Examiner must know, semiconductor wafers are fragile/delicate structures, requiring extremely high levels of cleanliness and care in their handling and processing. Through Applicant's testing, Applicant has discovered that while the application of sonic energy to the wafers assists in removing particles (i.e., cleaning), this same sonic energy damages the wafers. *See the Present Application*, ¶¶ [0009] - [0010]. Thus, the function of the claimed

**VERTE.076A****PATENT****Serial No. 10/059,682****Response to Office Action redated as of September 1, 2005**

invention is to provide a system that attenuates (i.e., reduces) the amount and/or amplitude of the sonic energy that is transmitted to the wafer surface.

To the contrary, none of the systems disclosed in Barbee, Japan '234, or Satoh, are concerned with the function of precisely controlling and/or attenuating the sonic energy applied to the target. In fact, in the relevant technical fields of Barbee, Satoh and Japan '234, maximizing the amount of sonic energy applied to the target is beneficial and a desired goal. For example, in Satoh, better mixing of the adhesive resins result as the amount of sonic energy applied to the resins is increased. Similarly, in Japan '234, a user's hands are cleaned more effectively if a greater amount of sonic energy is applied. The same applies in Barbee where greater sonic energy results in better gas/bubble removal. In fact, Barbee, states that the "[h]orn 37 advantageously is located closer to outlet 23 than to inlet 15, for maximum acoustic energy efficiency" and "the horn thus being at a vibration antinode for maximum energy transmission to the liquid" See *Barbee Col. 3, ll. 44-46 and Col. 3, ll. 37-39*] (emphasis added). Thus, the functioning of the claimed invention is entirely different than the functioning of the systems of Barbee, Satoh, and Japan '234. Therefore, one skilled in the art would not look to these prior art references when attempting to solve the particular problem discovered by the Applicant, which is cleaning semiconductor wafers without damage.

Applicant acknowledges that the claimed invention, the Barbee system, the Satoh system, and the Japan '234 system all utilize a sonic energy oscillator that comprises a transducer and a transmitter. However, this is where the similarities in structure stop. A mere review of the systems shown in the figures of the cited prior art references show the substantial differences in structure. For example, in Barbee, the oscillator assembly is submerged in liquid at the bottom of an enclosed tank. See Barbee, Fig. 1. In Satoh, the oscillator assembly is positioned in a groove of a large chemical mixer. See Satoh, FIG. 8. With respect to Japan '234, the oscillator assembly is contained within a housing a could not even be put in direct contact with a substrate See Japan '234, Fig. 1 The fact that a small component of the prior art machines is a sonic energy oscillator does not make the Barbee, Satoh, and Japan '234 systems similar in structure so that the references qualify as analogous prior art. The MPEP is clear in stating that "[a]scertaining the differences between the prior art and the claimed invention at issue requires

**VERTE.076A****PATENT****Serial No. 10/059,682****Response to Office Action redated as of September 1, 2005**

interpreting the claim language, and considering both the invention and the prior art references as a whole." See MPEP § 2142.02. (emphasis added) Thus, only looking at one small component of the larger Barbee, Satoh, and Japan '234 systems is improper.

Finally, separate Patent Office classification of references is to be considered evidence of "nonanalogy." See MPEP § 2141.01(a). The Examiner has classified the present application in International Classification ("ICL") H011 41/08 and United States Classification ("USCL") 310/328 for examination purposes. In comparison, Satoh is classified in ICL B01F 003/10 and USCLs 422/128, 366/69, 366/116, and 366/127. Barbee is classified in ICL B01D 019/00 and UCLs 96/175; 96/180; 96/197; 118/602; 118/612. Japan '234 is classified in B08B 003/12.

In view of the foregoing, there is no basis for concluding that the Satoh, Barbee, or Japan '234 references would be considered by one skilled in the particular art working on the pertinent problem to which the present invention pertains. See In re Horn, 203 U.S.P.Q. 969 (C.C.P.A. 1979). The Satoh, Barbee, or Japan '234 references are therefore considered non-analogous prior art and the rejection of claims 1, 2, 4-6, 8, 9, 11, 12, 14 and 20 over Lauerhaas in view of any of these references is clearly improper. It is respectfully requested that the rejections be withdrawn.

#### **The Combination of the References is Improper**

Even assuming arguendo that the Satoh, Barbee, and Japan '234 references are deemed to be analogous prior art, the combination of any of these references with Lauerhaas is still improper. First, it is undoubted that neither Lauerhaas, Satoh, Barbee, nor Japan '234 address the problem of preventing and minimizing damage to substrates during sonic energy cleaning. While Applicant acknowledges and understands that a reference does not have to expressly announce the motivation for combining the references, the law is well settled that if recognition of the source of the problem is neither taught nor suggested by the prior art, a rejection for prima facie obviousness is defective. Eibel Process Co. v. Minnesota & Ontario Paper Co., 261 U.S. 45, 68 (1923). Applicant respectfully submits that the discovery of the problem concerning damage to delicate devices on substrates, as well as the discovery of its remedy as set forth in the claims, are unobvious advances in the art.

**VERTE.076A****PATENT****Serial No. 10/059,682****Response to Office Action redated as of September 1, 2005**

Moreover, the Office Action assert that the motivation for modifying the transmitter in Lauerhaas as taught by either Satoh, Japan '234, or Barbee is for the purpose of "*providing efficient transmission of wave energy to the transmitter.*" However, this is the exact opposite of what occurs when one modifies the system of Lauerhaas to comprise at least one of (1) a gap in the transmission path between the transducer and an end face of the transmitter, and (2) a recess in the end face of the transmitter. As is explained throughout the specification of the present application, providing the gap or recess as claimed actually attenuates (i.e., reduces, dampens, etc.) the transmission of wave energy to the transmitter. Thus, the motivation cited in the Office Action is flawed and a prima facie case of obviousness has not been made. It is respectfully requested that the rejections be withdrawn.

Finally, as discussed above, Barbee's disclosure of an assembly that would allow for "maximum energy transmission" and "maximum acoustic energy efficiency" would defeat the intended function and purpose of applicant's invention. Thus, Barbee teaches away from applicant's invention, which addresses the problems present in the prior art through the attenuation of the sonic energy. Additionally, there is no suggestion or statement in Lauerhaas that it is desirable to attenuate the sonic energy or that the sonic energy is damaging the wafer. Thus, for the aforementioned reasons, the combination of Lauerhaas with Satoh, Barbee, or Japan '234 is believed to be the result of impermissible hindsight used to reconstruct the claimed invention.

#### **The Rejection of Claim 11 is Not Supported By the Disclosure of Cited Prior Art**

In addition to the reasons set forth above, the rejection of claim 11 is further improper because claim 11 requires, *inter alia*, that the "transducer be coupled to the transmitter in a manner to attenuate the energy transmitted to a lowermost portion of the transmitter while portions of the transmitter adjacent the lowermost portion are not so attenuated" and that "a coupler positioned in the transmission path between the transducer and the transmitter with the coupler being configured to attenuate the energy transmitted to said lowermost portion." Contrary to the assertions in the Office Action, no such device is shown in Barbee. The Office Action states that Barbee discloses a coupler (bottom part of housing 43). While there is a gap in this housing/coupler of Barbee, the gap is centrally located. As such, even if the coupler of

VERTE.076A

PATENT

Serial No. 10/059,682

Response to Office Action redated as of September 1, 2005

Barbee does attenuate the sonic energy, it will do so uniformly throughout the oscillator. However, claim 11 requires that the coupler attenuate the energy transmitted to a lowermost portion of the transmitter while portions of the transmitter adjacent the lowermost portion are not so attenuated. None of the other references supply the noted deficiency. It is respectfully requested that the rejection of claim 11 be withdrawn.

#### Claim Amendments

Claims 1 and 11 have been amended to remove the term "small" from the description of the gap formed between the transmitter and the substrate. This has been done for clarity/definiteness and is not believed to affect the scope of those claims because the small size of the gap is inherent in the recitation that "a meniscus of liquid is formed between the transmitter and the substrate."

Claim 26 is new. No new matter is added. Support can be found in claim 1 and claim 11.

#### Allowable Subject Matter

Claim 10 was indicated as being allowable if rewritten in independent form. Accordingly, claim 10 has been amended to be in independent form, incorporating all of the limitation of the base claim 1. However, it is requested that the Examiner note that the term "small" is also omitted from amended claim 10.

Claims 13 and 15-19 stand allowed

It is believed that all grounds for rejection and objection have been traversed or obviated, and all the rejections and objections should be withdrawn, and the application allowed.

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